

the mixture being measured exceeds 100 p.p.m. \pm 20 p.p.m.; and

(3) A device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when malfunction, breakdown, or other failure of the bilge monitor occurs.

(d) Each bilge monitor must have a device that is designed to record continuously the concentration of oil in p.p.m. that the monitor measures and to record the date and time of the measurements. The record must be durable enough to be kept for three (3) years. If the device has more than one scale, it must have a means to show on the record the scale in use at the time of the reading.

§ 162.050-31 Bilge monitor: Approval tests.

(a) This section contains requirements that apply to bilge monitors.

(b) *Test conditions.* (1) Each test must be conducted under the conditions prescribed in this section and under the conditions prescribed for cargo monitors in §§ 162.050-27 (b)(1) through (b)(4) and §§ 162.050-27 (b)(7) through (b)(13).

(2) Except as provided in Test No. 2BM, the oil used in each test must be a heavy fuel oil that has a relative density of approximately 0.94 at 15 °C. and a viscosity of at least 220 centistokes (approximately 900 seconds Redwood No. 1) at 37.8 °C.

(3) The water used in each test must be clean fresh water or clean fresh water in solution with sodium chloride. The water must have a relative density at 15 °C. that is equal to or less than 0.085 plus the relative density of the heavy fuel oil used in the tests.

(c) *Test No. 1BM.* (1) The bilge monitor is calibrated and zeroed. It is then fed with water for 15 minutes and then with mixtures in the following concentrations: 15 p.p.m., 50 p.p.m., 75 p.p.m., 100 p.p.m., and each additional concentration, in increments of 25 p.p.m. up to the highest oil concentration that can be read on the monitor. Each concentration is fed to the monitor in the order listed for fifteen (15) minutes. Water is fed to the monitor for fifteen (15) minutes between each mixture. At the end of each fifteen (15)

minute period an oil content reading is obtained and recorded.

(2) The metering and water pumps of the test rig are started and the oil content of the mixture is increased until the device required by § 162.050-29(c)(1) actuates. The oil content of the mixture causing actuation is recorded.

(3) The oil content of the mixture is then increased until the device required by § 162.050-29(c)(2) actuates. The oil content of the mixture causing actuation is recorded.

(d) *Test No. 2BM.* Test No. 1BM is repeated using, in lieu of a heavy fuel oil in the mixture, a light distillate fuel oil having a relative density of approximately 0.83 at 15 °C.

(e) *Test No. 3BM.* (1) The bilge monitor is fed with water, zeroed, and then fed with a 15 p.p.m. mixture until a steady reading is obtained and recorded. The time of first detecting oil in the mixture and the time of reaching the highest steady reading of oil content are also recorded. The metering pump is turned off after the highest steady reading is obtained. The time at which the highest steady reading starts to decrease and the time of returning to the lowest steady oil content reading are recorded. The oil content of the lowest steady reading is also recorded.

(2) The steps in paragraph (1) of this section are repeated using a 100 p.p.m. mixture.

(f) *Test No. 4BM.* (1) The bilge monitor is fed with water, zeroed, and then fed with a mixture containing (10) percent oil for one (1) minute. The following times occurring during this procedure are recorded:

(i) Time at which the monitor first detects oil.

(ii) Time of actuation of the device required by § 162.050-29(c)(1).

(iii) Time of actuation of the device required by § 162.050-29(c)(2).

(iv) Time of exceeding the highest oil concentration that can be read on the monitor.

(v) Time of returning to the highest oil concentration that can be read on the monitor.

(vi) Time of returning to the lowest steady oil content reading.

(2) The oil content of the mixture at the lowest steady reading described in

paragraph (f)(1)(vi) of this section is recorded.

(3) The monitor is fed with water, zeroed, and then fed with oil for one (1) minute after which the flow of water is resumed. The times described in paragraph (f)(1) of this section are recorded.

(4) The monitor is fed with a 15 p.p.m. mixture until a steady oil content reading is obtained and recorded.

(5) The monitor is fed with a 100 p.p.m. mixture until a steady oil content reading is obtained and recorded.

(g) *Test No. 5BM.* (1) The bilge monitor is fed with an 80 p.p.m. mixture until a steady reading is obtained and recorded.

(2) The monitor is fed with an 80 p.p.m. mixture to which enough sodium chloride has been added to provide a concentration of 60,000 parts per million of sodium chloride in water. The oil content reading, when steady, is recorded.

(3) The monitor is fed with an 80 p.p.m. mixture to which enough of the contaminant described in Table 162.050-27(g) has been added to provide a concentration of 20 parts per million of particulate contaminant in water. The oil content reading, when steady, is recorded.

(h) *Test No. 6BM.* (1) The bilge monitor is fed with a 5-10 p.p.m. mixture until a steady reading is obtained and recorded.

(2) If the monitor has a positive displacement mixture pump, the mixture pressure is lowered to one half of the monitor's maximum design pressure. If the monitor has a centrifugal mixture pump or is not equipped with a mixture pump, the mixture flow rate is reduced to one half of the monitor's maximum design flow rate. After reduction of the pressure or flow rate, the oil content of the mixture is increased until the device required by § 162.050-29(c)(1) actuates. The oil content causing actuation is recorded.

(3) The monitor is fed with an 80 p.p.m. mixture until a steady reading is obtained and recorded. The oil content of the mixture is then increased until the device required by § 162.050-29(c)(2) actuates. The oil content causing actuation is recorded.

(4) If the monitor has a positive displacement mixture pump, the mixture

pressure is increased to twice the monitor's maximum design pressure. If the monitor has a centrifugal mixture pump or if the monitor is not equipped with a mixture pump, the mixture flow rate is increased to twice the monitor's maximum design flow rate. After increasing the pressure or flow rate, the oil content of the mixture is increased until the device required by § 162.050-29(c)(1) actuates. The oil content causing actuation is recorded.

(5) The steps described in paragraph (h)(3) of this section are repeated.

(i) *Test No. 7BM.* (1) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(2) The water and metering pumps on the test rig are stopped for eight (8) hours after which the steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(j) *Test No. 8BM.* (1) The supply voltage to the bilge monitor is increased to one hundred and ten (110) percent of its design supply voltage. The monitor is then fed a 10 p.p.m. mixture for one (1) hour. At the end of the one (1) hour period, the oil content reading is recorded.

(2) The oil content of the mixture is increased until the device required by § 162.050-29(c)(1) actuates. The oil content causing actuation is recorded.

(3) The bilge monitor is fed with an 80 p.p.m. mixture for one (1) hour. At the end of the one (1) hour period, an oil content reading is obtained and recorded.

(4) The oil content of the mixture is increased until the device required by § 162.050-29(c)(2) actuates. The oil content causing actuation is recorded.

(5) The steps described in paragraphs (j)(1) through (j)(4) of this section are repeated with the supply voltage to the bilge monitor lowered to ninety (90) percent of its design voltage.

(6) Upon completing the steps described in paragraph (j)(5) of this section, the supply voltage to the monitor is returned to the design rating.

(7) The steps described in paragraphs (j)(1) through (j)(4) of this section are repeated varying each other power supply to the monitor in the manner prescribed in those steps for supply voltage.

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(k) *Test No. 9BM.* (1) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(2) An 80 p.p.m. mixture is fed to the bilge monitor for eight (8) hours. At the end of the eight (8) hour period, an oil content reading is obtained and recorded.

(3) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(4) The monitor is fed with water until a steady reading is obtained and recorded.

(l) *Test No. 10BM.* (1) All power to the bilge monitor is shut off for one (1) week. After one week the monitor is started, zeroed, and calibrated.

(2) The monitor is fed with an 80 p.p.m. mixture for one (1) hour. An oil content reading is then obtained and recorded.

(3) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(4) The monitor is fed with water for one (1) hour. An oil content reading is then obtained and recorded.

(5) The steps described in paragraphs (l)(2), (l)(3), and (l)(4) of this section are repeated three (3) additional times. During the last time that the step described in paragraph (i)(2) of this section is repeated, the monitor is inclined at an angle of 22.5° with the plane of its normal operating position.

§ 162.050-33 Bilge alarm: Design specification.

(a) This section contains requirements that apply to bilge alarms.

(b) Each bilge alarm must be designed to meet the requirements for a cargo monitor in §§162.050-25(b) through (g), §162.050-25(i), and the requirements in this section.

(c) Each bilge alarm must have a device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when—

(1) the oil content of the mixture being measured by the bilge alarm exceeds 15 p.p.m. \pm 5 p.p.m., and

(2) malfunction, breakdown, or other failure of the bilge alarm occurs.

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§ 162.050-35 Bilge alarm: Approval tests.

(a) This section contains requirements that apply to bilge alarms.

(b) *Test Conditions.* (1) Each test must be conducted under the conditions prescribed for cargo monitors in §§162.050-27 (b)(1) through (b)(5), §§162.050-27 (b)(7), (b)(8), (b)(10), (b)(11), and (b)(13).

(2) Each test must be performed using a light distillate fuel oil having a relative density of approximately 0.83 at 15 °C.

(3) The oil content of each sample must be measured using the method described in §162.050-39.

(c) *Test No. 1A.* The bilge alarm is calibrated and zeroed. The metering and water pumps of the test rig are started and the oil content of the mixture is increased until the alarm actuates. A sample of the mixture causing actuation of the alarm is taken. The alarm is then fed with water for fifteen (15) minutes.

(d) *Test No. 2A.* (1) The bilge alarm is fed with a 40 p.p.m mixture until the bilge alarm actuates. The time of turning on the metering pump of the test rig and the time of alarm actuation are recorded. The flow rate on the flow meter of the test rig is also recorded.

(2) The response time of the alarm is calculated as follows:

$$\text{response time} = T_2 - \left[T_1 + \frac{(\pi)(D^2)(L)}{4Q} \right]$$

T_2 =time of alarm actuation

T_1 =time of turning on the metering pump of the test rig

D =inside diameter of the mixture pipe (cm)

L =length of the mixture pipe (cm)

Q =flow rate (cm³/sec)

(e) *Test No. 3A.* (1) The metering and water pumps of the test rig are started and the oil content of the mixture is increased until the bilge alarm actuates. A sample of the mixture causing actuation of the alarm is taken.

(2) If the alarm has a positive displacement mixture pump, the mixture pressure is reduced to one-half (½) of the alarm's maximum design pressure. If the alarm has a centrifugal mixture pump or is not equipped with a mixture pump, the mixture flow rate is reduced